The Afghanistan Engineering Support Program assembled this deliverable. It is an approved, official USAID document. Budget information contained herein is for illustrative purposes. All policy, personal, financial, and procurement sensitive information has been removed. Additional information on the report can be obtained from Firouz Rooyani, Tetra Tech Sr. VP International Operations, (703) 387-2151.

TETRA TECH

# TECHNICAL MEMO

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| ***To:*** | [redacted] |
| ***Cc:*** | [redacted] |
| ***From:*** | [redacted] PE |
| ***Date:*** | December 10, 2015 |
| ***Subject:*** | Review and Comment on proposed SCADA work plan and schedule for Tarakhil Thermal Power Plant |

This memorandum is presented for the fulfillment of Administrative Work Order WO-A-0101. The Confirmation Letter for this administrative work order was concurred by COR on November 23, 2015.

At Tt AESP's request POWER Engineers, Inc. reviewed the proposed SCADA work plan. POWER's review now follows.

**Executive Summary**

- The plan in general is written at a high level, and lacks detail. It's unclear exactly what will be delivered, and what functionality will be restored, removed, added, improved, or degraded. It's also unclear what precautions will be taken to ensure the plant can be restored to current condition should planned upgrades fail.
- The test plan is vague, and does not specify acceptance criteria or test procedures.
- The schedule is aggressive and optimistic.
- Reprogramming the PLC logic without thorough testing could lead to degradation or failure of plant components, and present a hazard to personnel and equipment.

**Background:**

On November 06, 2015, via e-mail, Tetra Tech requested POWER:

"Review and comment on a SCADA Upgrade Program (work plan and Gantt charts) recently submitted by DABS to USAID for the Tarakhil Thermal Power Plant (TPP).

I have reviewed the contents of the file, and my observations are below.

**Observations:**

1. Regarding "Preparatory Work Schedule For Upgrading TPP's SCADA.pdf" created by DABS:
    a. Schedule timeframe and work elements seem reasonable, with the following exception:
        i. Material purchase and installation timeline appears aggressive (unless materials are readily available in the Kabul area).

2. Regarding “TPP's SCADA Upgradation Plan.doc” created by DABS:
    a. The plan is for 2 servers, and a total of 9 workstations (3 per control room) is envisioned. I also note 4 monitors per workstation are planned. That’s a total of 12 monitors in each control room, which will take up a large amount of space.
    b. The UPS-battery connection does not appear to be listed on either schedule. This could take approximately 2-3 days, including troubleshooting and confirming proper operation.
    c. Network and security requirements should be specified more clearly.
    d. Nothing has been discussed to resolve the existing interoperability problem that prevents the control of a block by any other block’s workstation. This problem is due to tag duplication which occurred when PLC software was restored by operators in late 2012.
    e. Nothing has been discussed to resolve broken hardware (as of April of 2014, 2 failed multifunction relays, part #MPU-2S, and 1 failed gateway interface converter, part # PCK-4). Failure to fix this hardware will prevent operation of affected gensets.
    f. It’s unclear what the extent of reprogramming existing PLC logic is (Phase V, #3). Technical requirements for testing are not specified. PLC reprogramming could result in departure from designed guidelines and safety interlocks, which is a hazard to personnel and equipment.
    g. The test plan lacks detail. It would be a good practice to prepare a test plan for the Employer’s approval before software modifications proceed. Such a procedure should identify detailed test procedures, provide acceptance criteria, and establish procedures to restore the system to its current status should planned upgrades fail.
    h. The details of software procurement lack detail. Currently, most of the Wonderware running at the plant is unlicensed. Moreover, use of Wonderware software in Afghanistan requires special export control paperwork. These problems are surmountable, but will take time.
    i. It’s unclear what is meant by “the three laptops” (Phase V).
3. Regarding “Work Schedule for Upgrading TPP's SCADA.pdf” created by DABS:
    a. Hardware (graphics cards, etc.) and software installation time appears aggressive.
    b. Depending on the speed of Internet, software installation (patches, etc.) will be a challenge.
    c. Installing new Wonderware on genset HMI’s may be a challenge given limited memory on the HMI computer. Moreover, if the HMI Wonderware fails, there is no procedure identified to restore HMI operability. If a genset’s HMI fails, that genset will be inoperable.
    d. Migration of Wonderware from old to new is aggressively scheduled.
    e. Development of O&M documentation is aggressively scheduled.
    f. It’s unclear what the scope of “Adding some new features and developing some old functionalities” means.
    g. Reconfiguring tags from the original German PLC code in only 10 days will be challenging. Preparing a “tag list” (Excel document with each tag and what it refers to), is a good practice. I believe there are approximately 5,000 tags in the system.
    h. There is no time allotted for testing the SCADA installation. This should be expected to take weeks.
4. General observations:
    a. It’s unclear whether there is a plan to maintain limited operability of the plant during the reconfiguration. If the plant will be entirely out of commission during the installation, that should

be made clear to stakeholders.

b. These documents do not contain a clear problem statement, or a clear description of what the system will do when the work is complete.

c. It's unclear exactly what new material will be installed. Preparing and presenting an inventory list of new hardware and software (including version number) would be good practice.

d. It's unclear whether spares will be provided.

e. It's unclear how licenses will be transferred to DABS, and how software will be controlled.

**End of Memo**